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920115-02



**ENVIRONMENTAL
MANAGEMENT OFFICE**



**RCRA FACILITY INVESTIGATION (RFI)
for
Redstone Arsenal (RSA), AL**



INSTALLATION RESTORATION



921130-04

HISTORY

- 1941 - 1950'S** • Tons of munitions and chemical agents, produced, demiled, disposed of and buried at RSA
- 1950's - 1970s** • Numerous Industrial Waste disposal sites operated during this time at RSA
- 1977 - 1978** • USATHAMA conducted an Installation Assessment of RSA identified wide spread DDT contamination as well as 25 past Chemical & Industrial Waste disposal sites and several active disposal sites

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INSTALLATION RESTORATION



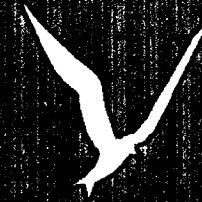
921130-04

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INSTALLATION RESTORATION



921130-04

HISTORY

- 1978 - 1982 • U.S. Army DDT Migration Abatement Program on RSA**
 - PCB Study conducted by USA THAMA and USEPA on RSA**
- 1983 - 1987 • Olin Corporation DDT Migration Abatement Program on Wheeler National Wildlife Refuge at RSA**
- 1987 - 1989 • Remedial Investigation of the 25 past disposal sites**

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INSTALLATION RESTORATION



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HISTORY

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RCRA FACILITY INVESTIGATION (RFI) for Redstone Arsenal, AL



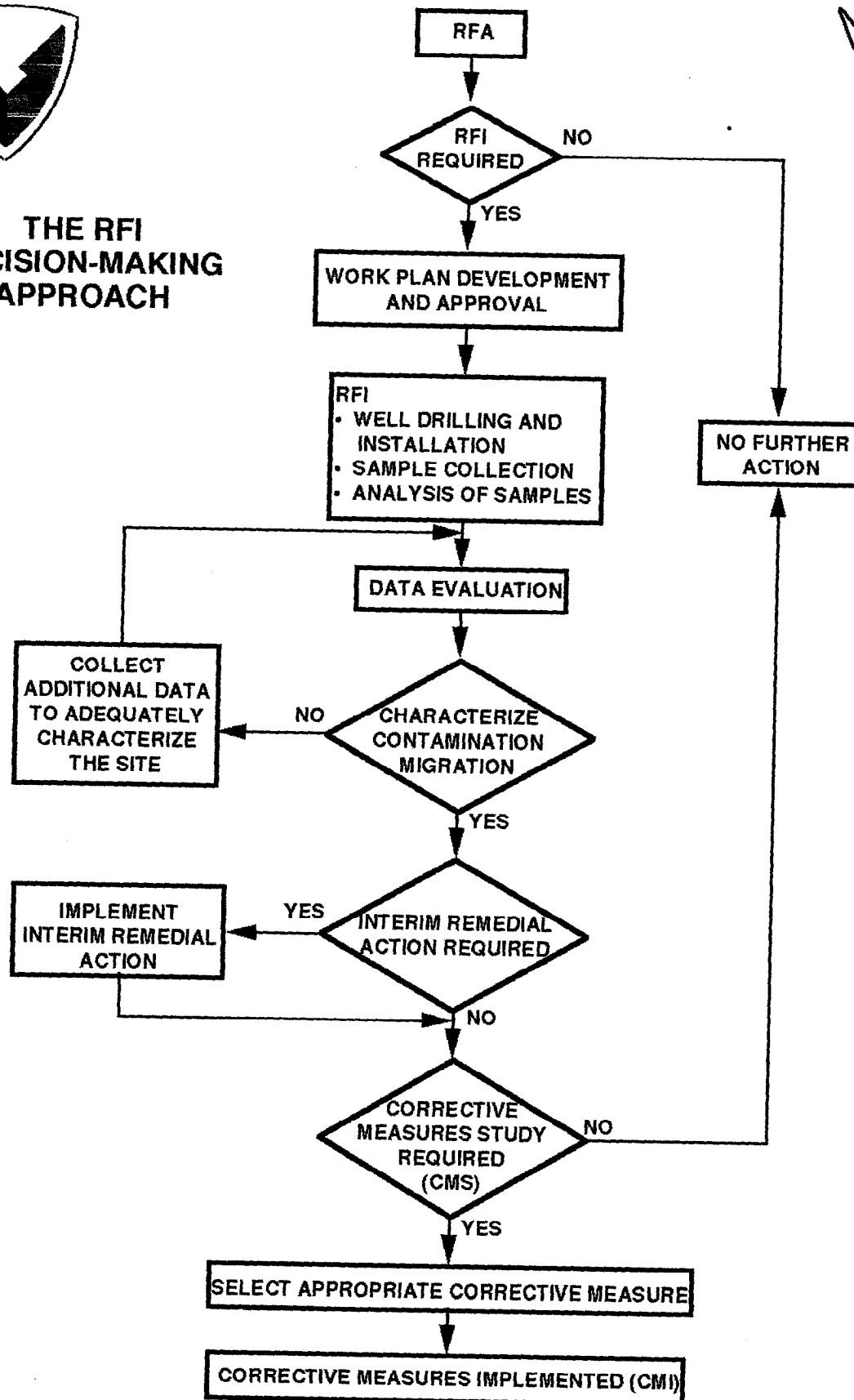
920115-03

RECENT DEVELOPMENTS

- **Provisions Of The MICOM Hazardous Waste Permit Require RSA To Identify, Investigate and Remediate All Known Solid Waste Management Units (SWMU's)**
- **A RCRA Facility Assessment (RFA) Was Finalized In February 1991 For All SWMU's at Redstone Arsenal and Marshall Space Flight Center (MSFC)**
- **The RFA Has Identified Approximately 289 Potential Contaminated Units At RSA and MSFC**
- **RSA Appears To Have Responsibility For 211 Of These Units**



THE RFI DECISION-MAKING APPROACH





TEST WELL DRILLING



TEST PIT COORDINATION

I R WORK AT REDSTONE ARSENAL



TEST PIT PREPARATION



HANDLING INVESTIGATION DERIVED WASTES



AREA 5/T



UNIT-1



UNIT 2



RSA-G



1965

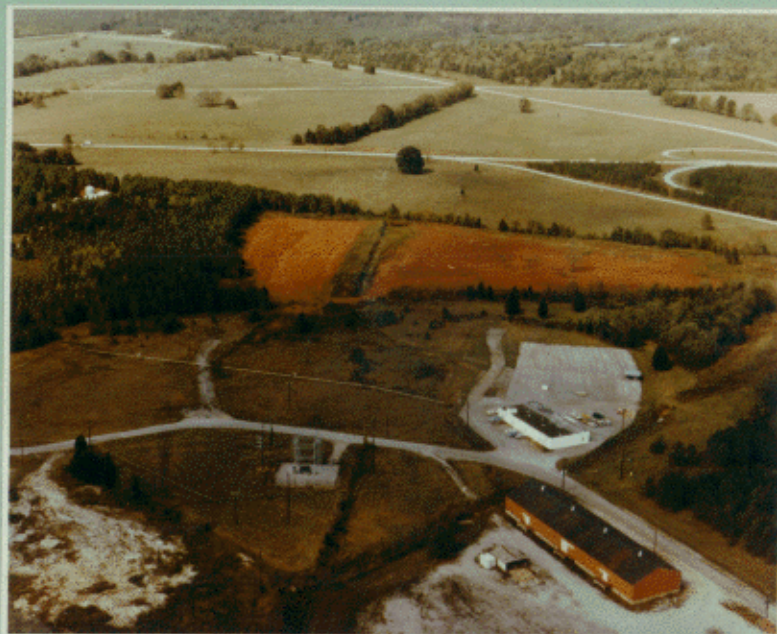


1965

AREA - F



1980



1980

REDSTONE ARSENAL IRP SCHEDULE

MARCH 1994

TASK	FY 87	FY 88	FY 89	FY 90	FY 91	FY 92	FY 93	FY 94	FY 95	FY 96	FY 97	FY 98	FY 99	FY 00	FY 01	FY 05	FY 15
PA/SI																	
REMEDIAL INVESTIGATION																	
RFI																	
CMS																	
INTERIM REMEDIAL ACTION																	
REMEDIAL DESIGN																	
REMEDIAL ACTION																	
GWT - O&M																	
MONITORING																	

* ONGOING PROJECTS WILL DETERMINE OUT-YEAR FUNDING AND REQUIRED ACTIONS

RCRA FACILITY INVESTIGATIONS AT REDSTONE ARSENAL, AL

- VG-1 TODAY I WOULD LIKE TO PRESENT A BRIEF PRESENTATION OF THE RCRA INVESTIGATIONS THAT HAVE BEEN CONDUCTED AT RSA. ALL OF THESE INVESTIGATIONS HAVE BEEN CONDUCTED AS A NON NPL SITE TO DATE. HOWEVER ON JUNE 21 1993 RSA WAS PLACED ON THE PROPOSED NPL LISTING BY EPA. THE PRIMARY CONCERN IS CONTAMINATION OF THE AQUIFER WITH VOCs.
- VG-2 RSA IS LOCATED IN ALABAMA IN THE NORTH CENTRAL LOCATION OF THE STATE.
- VG-3 RSA IS IN MADISON COUNTY, THE CITY OF HUNTSVILLE IS ON THE NORTH, EAST AND WEST SIDES ALONG WITH OTHER HIGHLY URBANIZED AREAS WHICH SURROUND THE INSTALLATION TO THE WEST. THE TENNESSEE RIVER IS OUR SOUTHERN BOUNDARY.
- VG-4 WITHIN RSA, MSFC HAS JURISDICTION FOR 1800+ ACRES. THE WNWR OWNS 4100 ACRES AND TVA OWNS 2900 ACRES WHICH RSA USES UNDER A LAND USE AGREEMENT. GAF IS 10 ACRES OUTLEASED, THIOKOL IS GO-CO PROPERTY.
- VG-5 HISTORY 1941 TO 1978
- VG-6 HISTORY 1978 TO 1989
- VG-7 DDT ABATEMENT PROJECT
- VG-8 DDT IN WATER 1987 TO 1992
- VG-9 DISTRIBUTION OF DDT IN CHANNEL CATFISH 1987 TO 1992
- VG-10 RECENT DEVELOPMENTS: IN 1986 THE USEPA UPON THE ISSUANCE OF A MODIFIED PART B HW PERMIT, REQUIRED RFIs ON ALL KNOWN SWMUs.
- VG-11 PRELIMINARY INVESTIGATIONS STARTED IN NOVEMBER OF 1987 IDENTIFIED 23 SITES AND INVESTIGATED 2 NOV AREAS PLUS THE PERIMETER GW WELLS.
- VG-12 TWO RFI STUDIES
- VG-13 GERAGHTY AND MILLER, UNIT 1, UNIT 2, UNIT 3
- VG-14 ENGINEERING SCIENCE, 5 PRIORITY SITES.
- VG-15 PHOTO OF TEST PIT PROJECT
- VG-16 TEST PIT SET UP

- VG-17 TEST PIT ITEMS OF SCRAP
- VG-18 TEST PIT ITEMS OF ORDNANCE
- VG-19 REMOVAL OF IDW
- VG-20 CORRECTIVE MEASURES STUDY HAS BEEN SENT TO USEPA AND ADEM
TOTAL COST OF RECOMMENDATIONS IS 320 MILLION DOLLARS
AEHA COMMENTS INDICATE RISK IS NOT WORTH THE COSTS
EPA INDICATES SAME, SO THE REMEDIAL ACTIONS WILL BECOME
PART OF OUR NEGOTIATIONS DURING THE NPL PHASE. NO FORMAL
REPLY FROM EPA OR ADEM YET.

CAMP, SENT TO EPA AND ADEM, LAYS OUT THE PRIORITIES FOR
ALL SWMUS FOR WHICH RSA ASSUMES RESPONSIBILITY (198)

104 NFAs

LEAVES 94

47 ONGOING

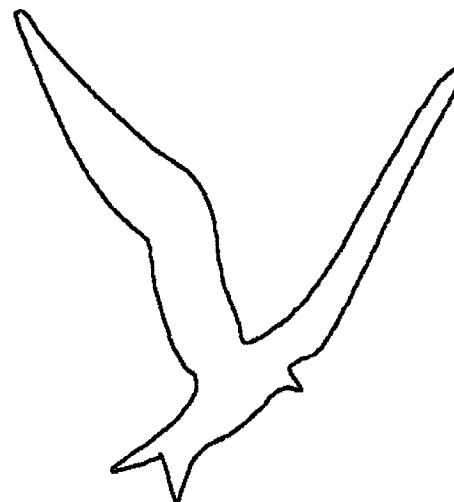
47 LEFT TO START RFI WORK

EPA HAS INITIALLY COMMENTED THAT THEY LIKE THE CAMP AND THAT
IT CAN BE USED AS A START FOR THE NPL COMPLIANCE SCHEDULE
NEGOTIATIONS. THESE SCHEDULES WILL OF COURSE DEPEND ON
FUNDING FROM DERA. AN RCS 1383 PROGRAMMATIC SCHEDULE HAS
BEEN SUBMITTED ALONG WITH THE CAMP FOR THIS PURPOSE. THE FY
94 WORK PLAN REFLECTS THIS SCHEDULE.

- VG-21 CMS TARGET SWMUs. AREA Q4 IS LOCATED IN WWR AND WILL
REQUIRE REMOVAL OF SOLID WASTE BECAUSE IT IS BURIED IN THE
UPPER GW LEVEL. THE EST COST IS 260 MILLION DOLLARS, THE
TIME FRAME TO DO IS 4 YEARS. A GW TREATMENT SYSTEM WILL BE
REQUIRED FOR 10 YEARS.
 - VG-22 CHEMICAL MUNITIONS SITES WHICH ARE NOW UNDER INVESTIGATION
 - VG-23 PHASE I INVESTIGATIONS BEING STARTED
 - VG-24 SCOPING SITES WITH RFI AWARD TO BE IN FY 93
 - VG-25 LOCATION OF MOST OF THE ACTIVE PROJECT SITES
(POINT OUT OB\OD, Q4, TCE SPILL)
 - VG-26 INTERIM TREATMENT TO BEGIN ASAP IN 5 SITES
AREA U INVOLVES CONSTRUCTION DUE TO NOV
HND IS EXECUTING AGENCY, MOBILE IS CONSTRUCTION AGENCY
READY FOR AWARD IN FY 93
- OB\OD AREA WILL BE FIRST GW TREATMENT SYSTEM, CESAS IS
EXECUTING AGENCY
- VG-27 AREAL PHOTO OF OB\OD AREA VIEW TO THE SOUTH

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ENVIRONMENTAL MANAGEMENT OFFICE

RCRA FACILITY INVESTIGATION (RFI)

for Redstone Arsenal (RSA), AL

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THE NATIONAL PRIORITIES LIST

NPL



930830-01

PURPOSE

- SERVES AS AN INFORMATION AND MANAGEMENT TOOL
- IDENTIFIES SITES WHICH WARRANT FURTHER INVESTIGATION
- NOTIFIES THE PUBLIC THAT EPA THINKS THE SITES WARRANT FURTHER INVESTIGATION
- SERVES AS A NOTICE TO RESPONSIBLE PARTIES THAT REMEDIAL ACTION MAY BE REQUIRED

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RCRA FACILITY INVESTIGATION (RFI) for Redstone Arsenal, AL



920115-05

Two RFI Studies Have Been Conducted At RSA

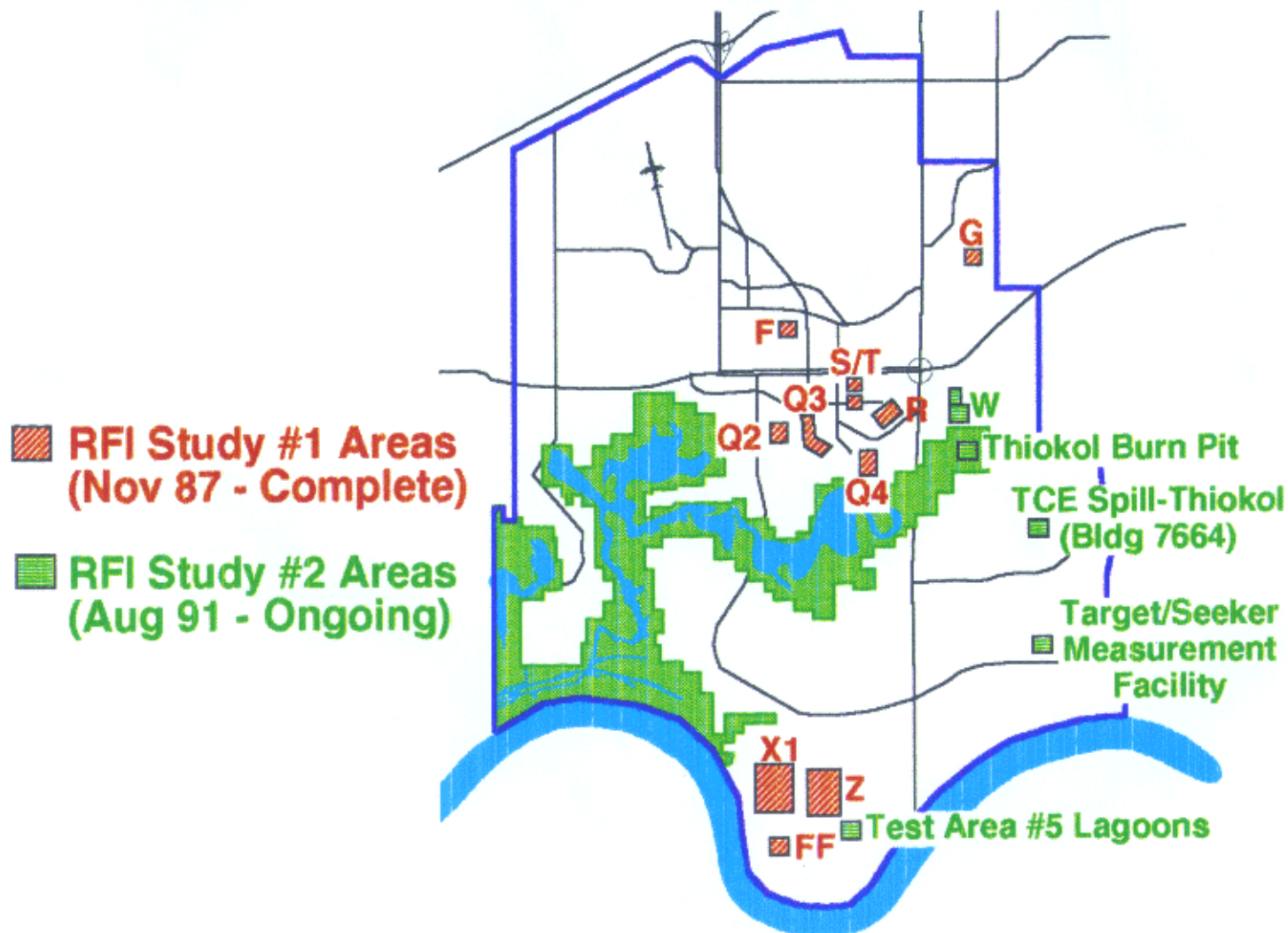
- **Study #1 - Units 1, 2, and 3 (10 Sites)
Geraghty & Miller, Inc.**
- **Study #2 - Five Additional Sites
Engineering-Science**



RCRA FACILITY INVESTIGATION (RFI) for Redstone Arsenal, AL



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RCRA FACILITY INVESTIGATION (RFI) for Redstone Arsenal, AL



921130-03

STUDY #1 PHASE I & PHASE II - COMPLETE SEPT 92

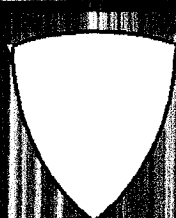
- **Contamination investigation started in Nov 87 for Unit 1, Unit 2 and Unit 3.**

Unit 1 - Closed disposal trenches of the sanitary landfill and DDT waste soils landfill (Q2)

Unit 2 - Open burn/open detonation area (FF)

Unit 3 - Eight Solid Waste Management Units (SWMU)
Area F - Arsenic ponds
Area G - Sanitary landfill and rubble fill
Area Q3 - Sanitary and industrial waste landfill
Area Q4 - Sanitary and industrial waste landfill
Area R - Construction Debris and industrial waste landfill
Area S/T - Sanitary and industrial landfill
Area X/X1 - Ash landfill/former chemical surety area
Area Y/Z - Industrial landfill and detonation area/former chemical surety area

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RCRA FACILITY INVESTIGATION (RFI) for Redstone Arsenal, AL



911211-01

STUDY #2 PHASE I - COMPLETE SEPT 92 PHASE II - START APR 93

- **RFI work at 5 additional contaminated sites started in August 91**
 - **Area W - Former sanitary/rubble fill area**
 - **Former TCE spill area - Thiokol (Bldg 7664)**
 - **Test Area #5 Lagoons**
 - **Target/Seeker Site - possible former sanitary/industrial landfill**
 - **Thiokol burn pit area**

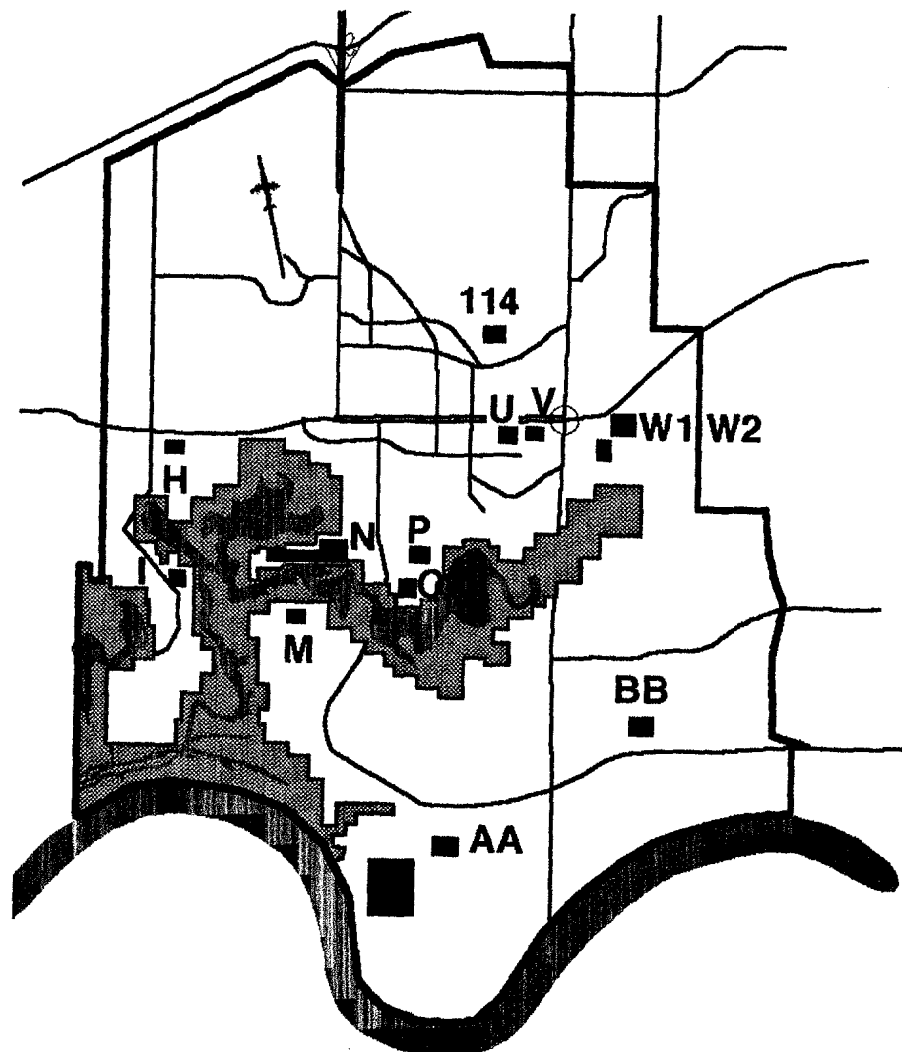
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RCRA FACILITY INVESTIGATION (RFI) for Redstone Arsenal, AL FY93



■ RFI Study #3
Proposed FY93



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FUTURE PLANS



020805-00

- **Inform Regulators and Public of Redstone Arsenal's Actions in the Investigation and Remediation of these Units.**
- **Investigate Remainder of SWMU's.**
- **Initiate Interim Treatment at all Heavily Contaminated Locations.**
- **Implement Long-Range Corrective Action on Contaminated Locations.**
- **Prepare Record of Determinations (ROD) for No Further Action Required (NFRA) SWMU's (Approx 115 Sites)**

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FUTURE PLANS



920805-06

- Investigate Remainder of SWMU's
- Initiate Interim Treatment at all Heavily Contaminated Locations
- Implement Long-Range Corrective Action on Contaminated Locations
- Inform Regulators and Public of Redstone Arsenal's Actions in the Investigation and Remediation of these Units.

DERIVED WASTE DRUM DISPOSAL
PROJECT

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INVESTIGATION DERIVED WASTE (IDW) DRUM DISPOSAL PROJECT



930203-01

- Apr 1989 - Dec 1991 Well Drilling Mud, Water, Samples & Clothing from RFI work drummed in accordance with USEPA requirements. Drums were considered to be part of the SWMU (Per EPA Guidance).
- Nov 1991 - Requests by RSA to bulk contents of all Drums as a hazardous waste were disallowed by USEPA.
- Sep 1992 - ADEM cites RSA for improper storage of Drums at the IR sites.
- Oct 1992 - RSA survey identifies 2115 Drums at 20 different IR sites.
- Oct 1992 - RSA tasks MRD thru HND to remove all Drums as a Rapid Response Action.
- Jan 1993 - Third scope of work submitted to EPA & ADEM. MRD contracts with OHM for removal.

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INVESTIGATION DERIVED WASTE (IDW) DRUM DISPOSAL PROJECT



930203-02

- Initial Site Visit (MRD & OHM) 12/2 - 3/92
- Scope of Services Issued 12/10/92
- Cost Proposal and Plans Submitted 12/23/92
- Negotiations Completed 1/27/93
- Revised Plans Submitted 2/16/93
- Delivery Order Award 2/16/93
- Begin On-Site Work 3/1/93
- Complete On-Site Work Dependent Upon Disposal
(Approximately 2 months)
- Draft Final Report 4 Weeks After Completion

NOTICE OF VIOLATION (NOV)
REMEDICATION SITES

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NOTICE OF VIOLATION INTERIM CLEAN UP CONSTRUCTION PLAN



921014-01

STATUS

SANITARY LANDFILL

Contract Award for Design of Interim Remedial Action (Done)	Sep 92
Contract Award for Corrective Measure Study (CMS) for Final Fix (Done)	Sep 92
IRA Design Completion	Jun 93
IRA Construction Contract Award	Oct 93
CMS Completion	Sep 93
IRA Construction Complete	Mar 94

OPEN BURNING/OPEN DETONATION

Contract Award for Design of IRA (Done)	Sep 92
Contract Awards for CMS for Final Fix (Done)	Sep 92
IRA Design Completion	May 93
IRA Construction Contract Award	Aug 93
CMS Completion	Sep 93
IRA Construction Complete	Feb 94



FIGURE 2-1 PROPOSED EXTRACTION WELL CONFIGURATION

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NOTICE OF VIOLATION INTERIM CLEAN UP CONSTRUCTION PLAN



921014-01

STATUS

AREA U, ARSENIC PONDS

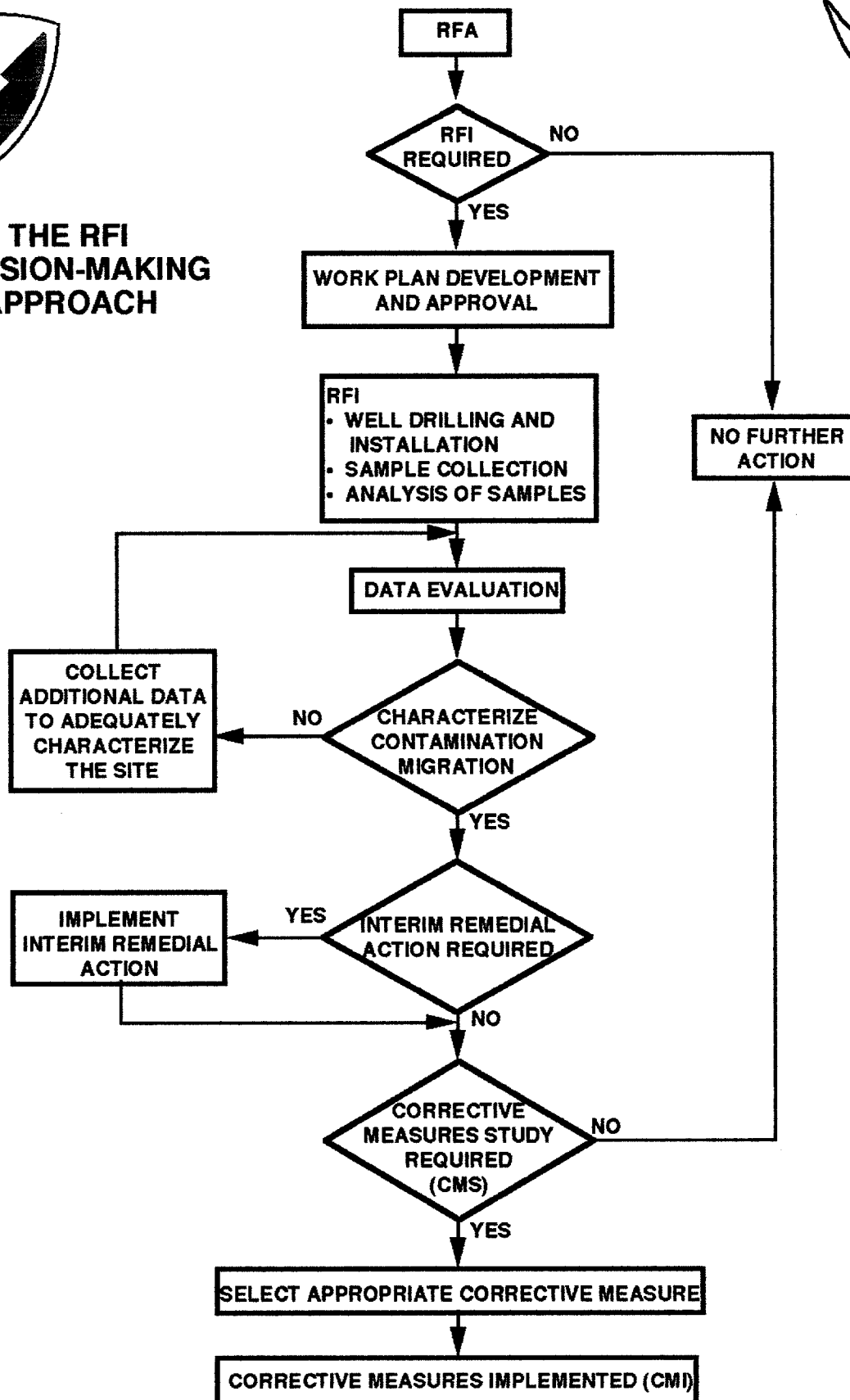
Contract Award for Design of ORA (Done)	Sep 92
Contract Award for CMS for Final Fix (Done)	Sep 92
IRA Design Completion	Jun 93
IRA Contruction Contract Award	Feb 94
Construction Start	Mar 94
Construction Complete (Est)	Jul 94

DESK SIDE

BRIEFING for the
COMMANDER



THE RFI DECISION-MAKING APPROACH



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REMEDIAL INVESTIGATION (RI) for Redstone Arsenal, AL



910805-12

RI started in Nov 87, completed Sept 89, Field Studies Included:

- Unit 1 - Closed disposal trenches of the sanitary landfill and DDT waste soils landfill**
- Unit 2 - Open burn/open detonation area**
- Unit 3 - 23 Solid Waste Management Units (SWMU)**
- Unit 4 - Monitoring of 17 RSA Perimeter Ground Water Wells**

**Contractor: P.E. Lamaroux
Executing Agency: Huntsville Division COE**

RCRA FACILITY INVESTIGATIONS AT REDSTONE ARSENAL

BREIFING TO GENERAL RIGBY

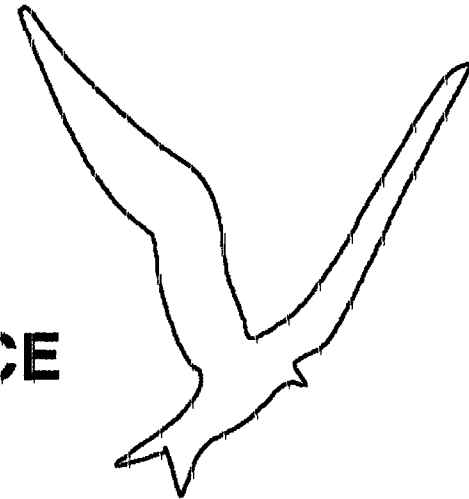
CHART NO.	DESCRIPTION
1	TITLE
2	HISTORY 1941 TO 1978
3	HISTORY 1978 TO 1989
4	RECENT DEVELOPMENTS
5	THE RFI DECISION MAKING APPROACH
6	REMEDIAL INVESTIGATION
7	RCRA FACILITY INVESTIGATIONS
8	STUDY # 1
9	STUDY # 2
10	MAP OF STUDY SITES
11	INSTALLATION RESTORATION FY 93
12	RFI MAP FY 93
13	FUTURE PLANS

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**ENVIRONMENTAL
MANAGEMENT OFFICE**



**RCRA FACILITY INVESTIGATION (RFI)
for
Redstone Arsenal (RSA), AL**



RCRA FACILITY INVESTIGATION (RFI) for Redstone Arsenal, Al



921130-C4

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RECENT DEVELOPMENTS

- **Provisions Of The MICOM Hazardous Waste Permit Require RSA To Identify, Investigate and Remediate All Known Solid Waste Management Units (SWMU's)**
- **A RCRA Facility Assessment (RFA) Was Finalized In February 1991 For All SWMU's at Redstone Arsenal and Marshall Space Flight Center (MSFC)**
- **The RFA Has Identified Approximately 289 Potential Contaminated Units At RSA and MSFC**
- **RSA Appears To Have Responsibility For 211 Of These Units**
- **115 Units No Further Action, 96 Units to be Studied**
- **51 Units Are Now Under Investigation**

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INSTALLATION RESTORATION RSA PROGRAMS FY 93



921114-01

PROJECT

- **Corrective Measures Study (10 Sites)**
- **Corrective Action Management Plan**
- **RFI New Starts (11 Sites)**
- **RFI Scoping (14 Sites)**
- **Interim Treatment Corrective Measures (5 Sites)**
- **Derived Waste Drum Disposal (2115 Drums)**

Cost To Date: About \$30 Million (Thru FY93)



FUTURE PLANS

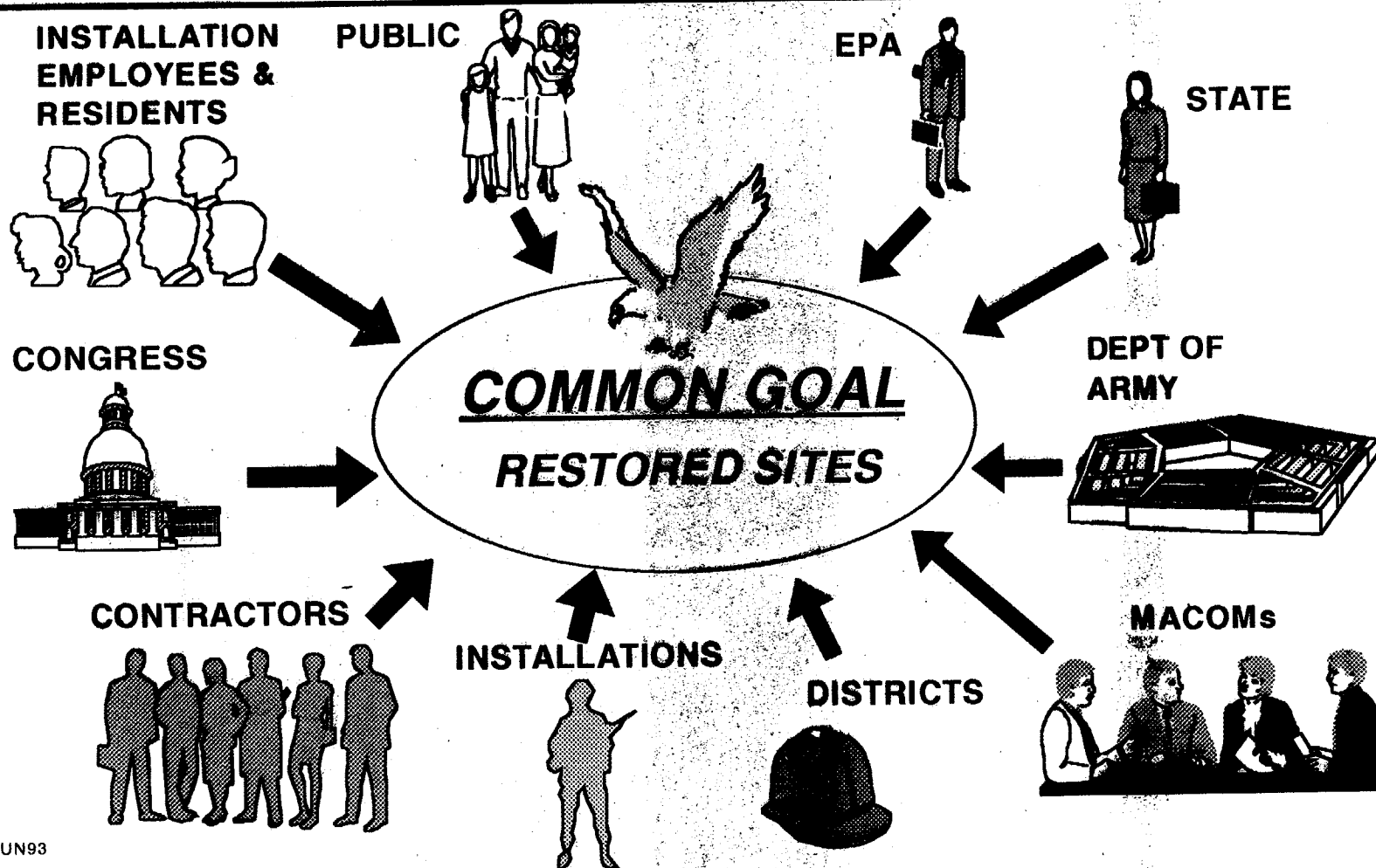


620895-09

- **Inform Regulators and Public of Redstone Arsenal's Actions in the Investigation and Remediation of these Units.**
- **Investigate Remainder of SWMU's (45).**
- **Initiate Interim Treatment at all Heavily Contaminated Locations.**
- **Implement Long-Range Corrective Action on Contaminated Locations.**
- **Prepare Record of Determinations (ROD) for No Further Action Required (NFRA) SWMU's (Approx 115 Sites)**
- **Estimated Cost for RFI Program = \$2 to 3 Billion**
- **Estimated Time to Implement = 10 to 20 years**



RESTORATION A TEAM EFFORT



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INSTALLATION RESTORATION RSA PROGRAMS FY 93



921114-01

ECT

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